Name: _____ **ID: A**

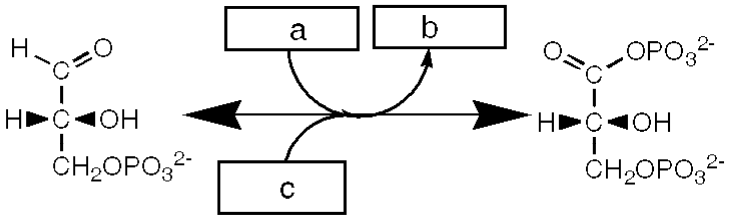
CHEM 155B - QUIZ 2 - 2/12/19

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. Sucrose is composed of the following simple sugars:
a. galactose
b. glucose
c. glucose and fructose
d. galactose and glucose

____ 2. The reduction of pyruvate into lactate during fermentation
a. is associated with reoxidation of the NADH produced during glycolysis
b. is associated with pyruvate decarboxylation
c. is coupled to UTP production
d. is specific to yeast cells

____ 3. Which group of small molecules best fit the boxes associated with the reaction shown below?

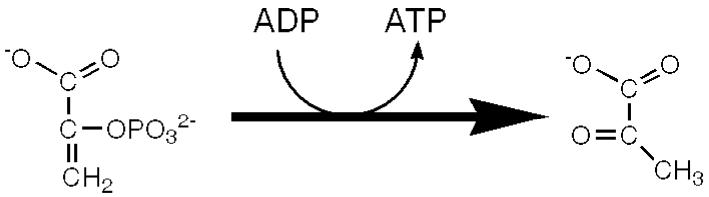


Gly-3-Phosphate 1,3-Bisphosphoglycerate

	a	b	c
I.	ATP	ADP	H_2O
II.	NADH	NAD^+	P_i
III.	NAD^+	NADH	H_2O
IV.	NAD^+	NADH	P_i

a. I
b. II
c. III
d. IV

____ 4. What is the name of the enzyme catalyst of the reaction shown below?



a. enolase
b. pyruvate dehydrogenase
c. pyruvate kinase
d. phosphoglycerate mutase

____ 5. The order of the glycolytic intermediate products between glucose and pyruvate is (PEP = phosphoenolpyruvate):
a. Fructose-1,6-*bis*phosphate, fructose-6-phosphate, 1,3-phosphoglycerate, 3-phosphoglycerate, PEP.
b. Fructose-6-phosphate, fructose-1,6-*bis*phosphate, PEP, 1,3-phosphoglycerate, 3-phosphoglycerate.
c. Fructose-6-phosphate, fructose-1,6-*bis*phosphate, 1,3-phosphoglycerate, 3-phosphoglycerate, PEP.
d. Fructose-6-phosphate, fructose-1,6-*bis*phosphate, 3-phosphoglycerate, 1,3-phosphoglycerate, PEP.

____ 6. Consider the following reaction which has a $\Delta G'^{\circ} = +0.4$ kJ/mol.

$A + B \leftrightarrow C + D$

1 M A, 1 M B, 0.1 M C and 0.1 M D are added to a container at room temperature. Which of the following statements is true?
a. The reaction will proceed in the forward direction to reach equilibrium.
b. The reaction will proceed in the backward direction to reach equilibrium.
c. The reaction will not proceed in either direction; it is already at equilibrium.

____ 7. In which cellular compartment do the the reactions of glycolysis happen?
a. the cytosol.
b. the mitochondrial matrix.
c. the endoplasmic reticulum.
d. the lysosomes.

____ 8. The isomerization of dihydroxyacetone phosphate in glyceraldehyde 3-phosphate
a. is associated to the enzyme catalyst triose phosphate isomerase.
b. requires several steps
c. requires the coenzyme NAD+
d. is associated to the enzyme catalyst glyceraldehyde 3-phosphate dehydrogenase

____ 9. During glycolysis, ATP is synthesized via a coupling process known as
a. phosphate-level phosphorylation
b. oxidative phosphorylation
c. photophosphorylation
d. substrate-level phosphorylation

____ 10. What is the net ATP yield per glucose during glycolysis?
a. 1
b. 2
c. 3
d. 4

____ 11. Glycogen is
a. polysaccharide storage polymer found in plants
b. a linear polysaccharide
c. a highly branched polysaccharide found in animals
d. a synthetic sugar substitute

____ 12. Glycogen is mainly found in
a. liver and muscle.
b. liver and brain.
c. muscle and brain.
d. liver, muscle, and brain.

____ 13. The enzyme that catalyzes the interconversion of glucose-1-phosphate and glucose-6-phosphate is
a. a hydrolase.
b. a phosphorylase.
c. a mutase.
d. a dehydrogenase.

____ 14. Which enzyme cleaves the $\alpha(1 \rightarrow 6)$ bonds in glycogen?
a. glycogen phosphorylase
b. debranching enzyme
c. phosphoglucomutase
d. glycogen synthase
e. There are no $\alpha(1 \rightarrow 6)$ bonds in glycogen.

____ 15. If an individual lacked the debranching enzyme, the effect would be:
a. the individual could not make glycogen
b. the individual could make glycogen but not store it
c. the individual would not be able to utilize any glucose unit from glycogen
d. the individual would not be able to completely break down a glycogen molecule

____ 16. The compound uridine diphosphate glucose (UDPG) plays a role in
a. glycogen breakdown.
b. glycogen synthesis.
c. glycolysis.
d. lactic fermentation.

____ 17. Glucose-6-phosphatase activity is found associated with the membranes of the endoplasmic reticulum.
a. True
b. False

____ 18. When glycogen synthase is phosphorylated
a. its activity decreases.
b. its activity increases.
c. its activity is unaffected.
d. That enzyme doesn't get phosphorylated.

____ 19. I am performing a reaction, A → B, with a $\Delta G^{\circ\prime} = -0.3$ kJ/mol. I start the reaction with 10 mM A and no B. After allowing the reaction to proceed for 24 hrs at room temperature (25ºC) and atmospheric pressure (1 atm), I analyze a sample of the reaction mix to find I now have 1 mM A and 9 mM B. Which of the following conclusion should I make?
a. The reaction has reached equilibrium.
b. I should come back again later; equilibrium has not yet been reached.
c. The formation of B from A is thermodynamically unfavorable, so I should find another starting material to make B.
d. Something's wrong; there's no way I could get that result with that $\Delta G^{\circ\prime}$

____ 20. Consider the following reactions:

$ATP \rightarrow ADP + P_i$	$\Delta G^{\circ\prime} = -31$ kJ/mol
glucose-6-phosphate → glucose + P_i	$\Delta G^{\circ\prime} = -13$ kJ/mol
glucose + ATP → glucose-6-phosphate + ADP	$\Delta G^{\circ\prime} = ?$

What is the $\Delta G^{\circ\prime}$ of the last reaction?
a. –44 kJ/mol
b. –18 kJ/mol
c. +18 kJ/mol
d. +44 kJ/mol

CHEM 155B - QUIZ 2 - 2/12/19
Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1 OBJ: Modified from 5e
   TOP: Important Oligosaccharides
2. ANS: A PTS: 1 TOP: Anaerobic Metabolism of Pyruvate
3. ANS: D PTS: 1 TOP: Glyceraldehyde-3-Phosphate to Pyruvate
4. ANS: C PTS: 1 TOP: Glyceraldehyde-3-Phosphate to Pyruvate
5. ANS: C PTS: 1 TOP: Overall Pathway
6. ANS: A PTS: 1 OBJ: New in 6e
   TOP: Standard States for Free Energy Changes
7. ANS: A PTS: 1 OBJ: New in 6e TOP: Overall Pathway
8. ANS: A PTS: 1 TOP: Glucose to Glyceraldehyde-3-Phosphate
9. ANS: D PTS: 1 OBJ: Modified from 5e
   TOP: Glyceraldehyde-3-Phosphate to Pyruvate
10. ANS: B PTS: 1 OBJ: Modified from 5e
    TOP: Overall Pathway
11. ANS: C PTS: 1 TOP: Polysaccharide Structures and Functions
12. ANS: A PTS: 1 TOP: Glycogen Metabolism
13. ANS: C PTS: 1 OBJ: New in 6e TOP: Glycogen Metabolism
14. ANS: B PTS: 1 OBJ: New in 6e TOP: Glycogen Metabolism
15. ANS: D PTS: 1 OBJ: New in 7e TOP: Glycogen Metabolism
16. ANS: B PTS: 1 TOP: Glycogen Metabolism
17. ANS: A PTS: 1 TOP: Glycogen Metabolism
18. ANS: A PTS: 1 TOP: Glycogen Metabolism
19. ANS: D PTS: 1 TOP: Modified Standard State for Biochemistry
20. ANS: B PTS: 1 OBJ: New in 6e TOP: Production and Use of Energy

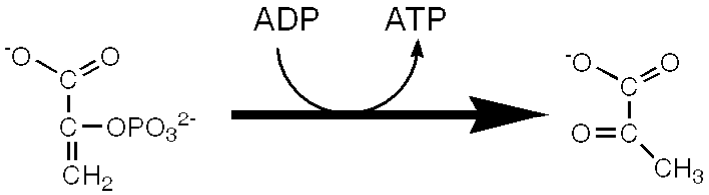
Name: _____ **ID: B**

CHEM 155B - QUIZ 2 - 2/12/19

Multiple Choice
Identify the choice that best completes the statement or answers the question.

____ 1. What is the net ATP yield per glucose during glycolysis?
a. 3
b. 2
c. 4
d. 1

____ 2. What is the name of the enzyme catalyst of the reaction shown below?



a. pyruvate dehydrogenase
b. enolase
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d. pyruvate kinase

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a. photophosphorylation
b. oxidative phosphorylation
c. substrate-level phosphorylation
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____ 4. If an individual lacked the debranching enzyme, the effect would be:
a. the individual would not be able to completely break down a glycogen molecule
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c. the individual could make glycogen but not store it
d. the individual could not make glycogen

____ 5. Glycogen is
a. a synthetic sugar substitute
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____ 6. Sucrose is composed of the following simple sugars:
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b. glucose
c. galactose and glucose
d. galactose

____ 7. Which enzyme cleaves the $\alpha(1 \rightarrow 6)$ bonds in glycogen?
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   c. Fructose-6-phosphate, fructose-1,6-*bis*phosphate, PEP, 1,3-phosphoglycerate, 3-phosphoglycerate.
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   c. a mutase.
   d. a phosphorylase.

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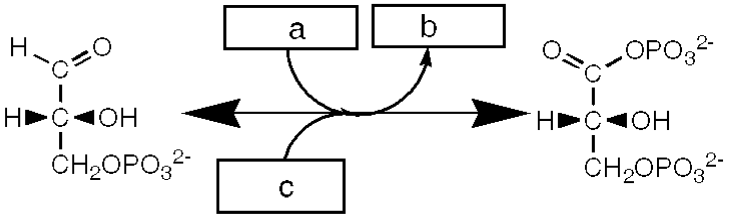

Gly-3-Phosphate 1,3-Bisphosphoglycerate

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b. The reaction will not proceed in either direction; it is already at equilibrium.
c. The reaction will proceed in the forward direction to reach equilibrium.

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a. liver and muscle.
b. muscle and brain.
c. liver and brain.
d. liver, muscle, and brain.

CHEM 155B - QUIZ 2 - 2/12/19
Answer Section

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